

Studies in African Bombyliidae. VII. On *Dischistus*
Loew and related genera, and *Bombylisoma* Rondani,
with some zoogeographical considerations

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The Mediterranean genera *Acanthogeron* Bezzi and *Lissomerus* Austen are synonyms of *Dischistus* Loew. *Bombylodes* Paramonov and *Efflatounia* Bezzi are re-defined; *Karakumia* Paramonov is a synonym of *Efflatounia* and *Efflatounia berbera* spec. nov. is described from Algeria. The distribution of *Dischistus* and of some related genera, which together form an old Gondwanan group, is discussed. *Bombylisoma* Rondani is the correct name for European and Asiatic species previously contained in *Dischistus* auct. and *Chasmoneura* Hesse is a synonym. *Bombylisoma simba* spec. nov. is described from Kenya and *Bombylisoma microlepidum* spec. nov. from Madagascar. The distribution of the genus is discussed and one group of species is shown to be probably associated with a genus of Rubiaceae.

This series is entitled "Studies in African Bombyliidae", a title consciously chosen rather than one alluding to the Ethiopian Region. There is a confusion between the Region and the country Ethiopia, which cannot be resolved by referring to the latter as "Abyssinia" (Greathead, 1967). The northern limit of the Ethiopian Region is usually put at 23½° N., which effectively restricts the Region to Africa south of the Sahara (a more cumbersome definition but preferable to "sub-Saharan"). Some authors, as Moreau (1952a) extend the northern limit to 30° N. which brings in the south-western end of the Atlas range and Egypt as far north as Cairo, or, as Colbert (1971), define the Region as Africa south of the Atlas mountains, which leaves a somewhat indefinite boundary east of these mountains.

The current theories of continental drift (see e.g. Dietz & Holden 1970; McElhinney 1970; Smith & Hallam 1970; Tarling 1971; Jardine & McKenzie 1972) while varying in the pre-drift reconstructions presented, all emphasise the geological continuity and integrity of Africa. Extensive recent work on African palaeo-climates (reviewed in Moreau 1952b, 1963, 1966; Howell & Bourliere 1964; Cloudsley-Thompson 1971; see also an interesting account of a possible climate and environment of the Oligocene at Fayum by Simons 1967) places the present aridity of the Sahara in a longer perspective and enables one to realise that ambient conditions are not unique either geographically or in time. It should be emphasised that the aridity of northern Africa is indeed recent. Cloudsley-Thompson (1971) has pointed out that the whole of (human) inhabited North Africa supported an extensive and varied tropical African fauna well into historical times, in the North Sudan and Upper Egypt, now desert, as late as the 19th century. Perhaps the Sahara has been as much a psychological barrier to northern

hemisphere taxonomists as a physical barrier to species living in or near it—as many species indubitably do—since there has been a marked tendency to consider African taxa separate from southern Palaearctic taxa simply because they are “sub-Saharan”. Reversing the point of view, from south of the Sahara, the North African coast and the Mediterranean are “sub-Saharan”. The northern latitude equivalent to Cape Town is approximately that from Casablanca to Damascus, so that a substantial fauna of what is traditionally thought of as southern Palaearctic is “northern sub-Saharan”.

The logical extension of these comments is that the African continent and the Ethiopian zoogeographical Region should be considered as co-extensive and the Region renamed simply the African Region. This has been my own concept of the Region for some time, hence the title of the series, and a wider acceptance of a revised northern Regional limit would help to overcome finally the conceptual isolation of most of Africa as sub-Saharan. It would also be more consonant with modern ideas about continental drift.

The genera discussed in this contribution are good illustrations of the artificial segregation of “sub-Saharan” taxa. The establishment of correct generic status for some allegedly endemic Palaearctic taxa has not only provided an excellent demonstration of the basic unity of African faunas at continental extremes but has also shown that significant elements of the bombyliid fauna of even Central Europe are of African origin. The revised taxonomy has also stimulated some speculations on intercontinental relationships.

Genus *DISCHISTUS* Loew

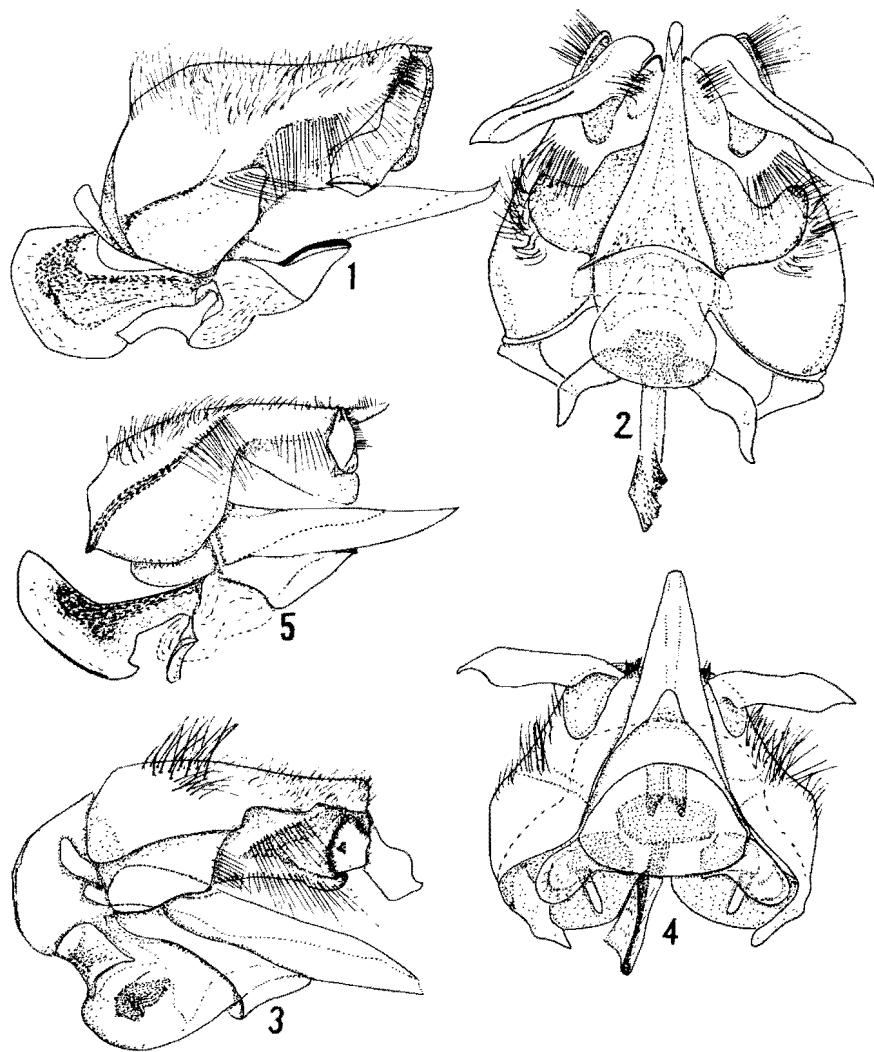
Dischistus Loew 1855: 45. Type species, *Bombylius mystax* Wiedemann, by designation of Becker 1912: 494.

Acanthogeron Bezzi 1925: 164. Type species, *Bombylius senex* Meigen, by original designation **syn. nov.**

Lissomerus Austen 1936: 33. Type species *niveicomatus* Austen, monotypic. **syn. nov.**

Hesse (1938) pointed out that there were two separate designations of the type species of *Dischistus*. The first of these was by Becker (1912) and cited *Bombylius mystax* Wied., the first species listed by Loew. The second was by Brunetti (1920) who designated *Bombylius minimus* Schrank, the second species listed by Loew. Hesse was correct in his contention that Becker's fixation of *mystax* is valid and that Brunetti's subsequent designation cannot stand. However, all workers on the Palaearctic fauna have, since 1920, accepted Brunetti's designation and have, unfortunately, ignored Hesse's work. There are thus two quite different interpretations of *Dischistus*. That of Hesse, which limited the genus to a small group of South African species, is correct and since the *Dischistus* of authors accepting *minimus* as type species is quite distinct from *Dischistus s. str.*, the *minimus* group of species must be placed in a separate genus. This, as shown below, is *Bombylisoma* Rondani.

The “sub-Saharan” disability has resulted in another pertinent discovery of Hesse (1938) being ignored. He showed that *Dischistus hirticeps* (Bezzi) bore all the characters of the Palaearctic genus *Acanthogeron* Bezzi yet, apart from the closed first posterior cell of the wing, was a genuine *Dischistus*. *Acanthogeron* was established for a group of species similar to *Bombylius senex* Mg., the sole diagnostic character used by Bezzi being the allegedly unique (for the Bombyliinae) presence of spines on the ovipositor. This, of course, is not a unique feature, although *Acanthogeron* is a well differentiated



Figs 1-5. *Dischistus* species, male genitalia. 1-2. *D. senex* (Mg.). 1. Side, and 2. ventral views. 3-4. *D. perniveus* (Bezzi). 3. side, and 4. ventral views. 5. *D. niveicomatus* (Austen), side view.

genus in the context of the Palaearctic fauna, including several species in the south of the Iberian peninsula, North Africa and Asia Minor. However, apart from the common possession of a closed first posterior cell they differ in no significant particular from *D. mystax* and not at all from *D. hirticeps*. Figs 1 to 4 illustrate the male genitalia of "*Acanthogeron*" *senex*, the type species (specimen from Spain, Malaga) and a second species, possibly *perniveus* Bezzi, and they are indistinguishable, except on detail, from the very characteristic male genitalia of *Dischistus* species. At least four other species have been examined and all are *Dischistus*, but before correct names can be applied, the Mediterranean species require revision.

The genus *Lissomerus* was erected for a solitary male from Jerusalem. It was differentiated from *Bombylius* L. by several characters but it is not at all evident why a closer comparison was not made with *Acanthogeron*. Fig. 5 illustrates the genitalia of a male from Wadi Helt, Israel, identified as *L. niveicomatus* by van Emden and confirmed by comparison with the type in the British Museum (Natural History) and it is obvious that the species is a *Dischistus*. In fact it is possible that *niveicomatus* Austen is the same as *syriacus* Villeneuve, from which *niveicomatus* was separated by the just contiguous eyes compared with the separated eyes of *syriacus*. The only male of *syriacus* examined, a paratype, is unfortunately headless but the genitalia, which are exposed, do not appear to differ from those of *niveicomatus*. It is clear that the genera *Acanthogeron* Bezzi and *Lissomerus* Austen are congeneric with *Dischistus* Loew.

The distribution of *Dischistus* is shown in fig. 6. (I have not found any records to substantiate the statement by Engel (1933) that *D. senex* occurs in southern France and in Persia; these areas are omitted from the map). The distribution is strongly disjunct, as would be expected, but it is evident that the northern distribution is African, the incursion into southern Spain and southern Portugal being in localities close to the Gibraltar gap and in Asia Minor being confined to a narrow belt near the coast as far north as Baalbek which, incidentally, is at about 34° N. compared with 34° S. approximately for the Cape. As is shown later, there are genera of the *Dischistus*-series with distributions outside Africa and also sharing significant features, other than those common to the series, with extralimital genera. However, I have seen no bombyliid which could be considered as *Dischistus* or a closely related taxon from any other Region. The genus seems, therefore, to be an African endemic and, since nothing similar has been seen in extensive material from Madagascar, probably dates from a period subsequent to the separation of Madagascar from Africa, i.e. post-Late Cretaceous. The occurrence of a species in the east Canary Islands (*D. atlanticus* (Arias)) confirms this dating. According to Dietz & Sproll (1970) the east Canary Islands are a micro-continent rifted away from north-west Africa in either mid-Triassic or early Cainozoic times, in the latter case associated with the Alpine orogeny and the creation of the Atlas fold-belt. A mid-Triassic separation is not congruent with the distribution of *Dischistus* but a separation in the early Caenozoic is and it may thus be suggested that *Dischistus* is a southern African genus of late Cretaceous origin which, by the early Caenozoic, had spread throughout the continent.

The widely disjunct North-South distribution provokes the speculation that it may be the consequence of Tertiary pluvials. Assuming ecological equivalence, then species of *Dischistus* have always inhabited arid or semi-arid zones. The genus would, therefore, have had a very much wider distribution under more arid conditions and the contraction of arid and semi-arid areas during a pluvial would contract the area of distribution of the genus. Given the generally accepted geographical pattern of pluvial

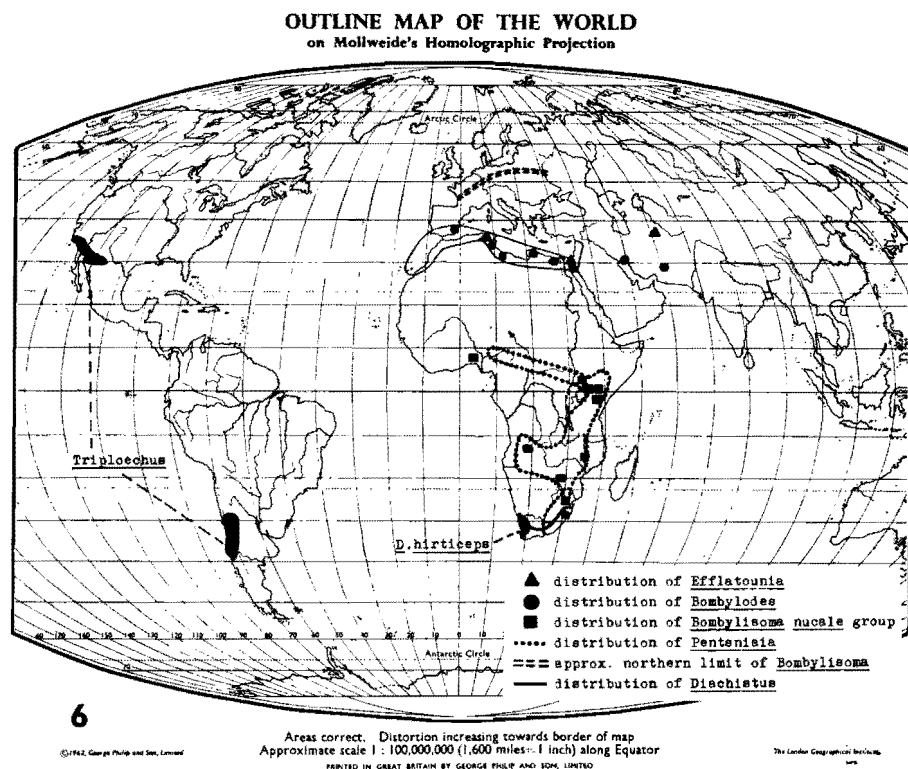


Fig. 6. Distribution of *Dischistus* and the related genera *Efflatounia*, *Bombylodes* and *Triploechus*: distribution of the *Bombylisoma nuale* group of species in relation to that of the rubiaceous genus *Pentanisia*: the approximate northern limit, in Europe, of *Bombylisoma* is also shown.

expansion of non-arid areas, the genus would inevitably be squeezed into extreme northern and southern refuges. The present distribution is thus a pre-pluvial relict one, although it is not possible to say with any confidence, from which epoch it may date. Further comment is to be found in the discussion of the distribution of *Bombylisoma*. It is also of interest to note the distribution of those species with closed first posterior cell; one, *hirticeps*, occurs in the more arid areas of the south-west Cape as far as Namaqualand, while all the others occur in North Africa, where there are no species with an open first posterior cell. This character is plesiomorphic, so that apomorph species were responsible for the major expansion of the genus from its southern origin. Following the first burst of speciation and northward spread the genus has been conservative. The Canary Island species, which has been separated from the mainland species for upwards of 50 million years, is extremely similar to *senex*, so similar that Engel synonymised the two.

Genus *BOMBYLODES* Paramonov

Bombylodes Paramonov 1940: 65, 339. Type species, *Bombylius multisetosus* Loew, by original designation.

This is a little known genus created for four species. Three of these were included by Engel (1933), prior to Paramonov's paper, and by Efflatoun (1945) subsequent to it, in *Dischistus* auct.; the fourth was described by Becker (1913) and accepted by Engel (1933) as the sole Palaearctic representative of the otherwise New World genus *Sparnopolius* Loew. *Bombylodes* is a valid genus, except in so far as it is related to *Efflatounia*, a matter discussed later, and is characterised as follows: Bombyliinae of large size, densely pilose, the bristly elements fine, not readily distinguishable from other pubescence even on thorax; head as broad or broader than width of thorax, eyes with posterior margin slightly sinuous or concave, in male narrowly separated by up to width of anterior ocellus, in female by about four times width of large ocellar tubercle which is elevated from slightly depressed vertex; antero-lateral areas of frons slightly inflated, most prominently in female, and separated from upper facialia by a distinct groove, frons of female also with a shallow, transverse median depression; face prominent, tumid, genae broad, genal sulcus prominent; antennae with first segments simple, not enlarged, third broadened basally with a very short, indistinctly two-segmented style; proboscis long or very long, palps not densely pilose, long; thorax with mesonotum slightly arched anteriorly and slightly above level of vertex, ptero- and metapleura bare, hypopleura with long, dense tufts antero-ventral and postero-ventral to spiracle; legs long and slender, basitarsi longer than combined lengths of remaining segments which are laterally compressed, femora spiculate, claws large, simple but with swollen bases, pulvilli reduced; wings with first posterior cell widely open, r-m at or near apical third of discal cell, latter apically obtuse, cross-vein m1-m2 about half length of r-m, basal comb slightly developed, axillary lobe with "angle" large and rounded, thereafter rapidly narrowing to apex of anal vein, alula well developed, lobate; hypopygium of male with basimeres more or less shell-like, telomeres simple, aedeagus comparatively short but with ventral process well developed and apically membranous.

The genus is readily distinguishable from *Dischistus* by the pilose face, the simple, not swollen, first antennal segments and the large hypopleural tufts. The male genitalia, of which those of *multisetosus* and *eximius* (Becker) are illustrated in figs 7-9, are quite distinct from *Dischistus*. The head and antenna of a female *eximius* are shown in figs 10-11. The sinuous posterior eye margin is more pronounced in some individuals than in others, generally more so in females such as the one illustrated (from Biskra, Algeria) and more evident in *eximius* than in *multisetosus*.

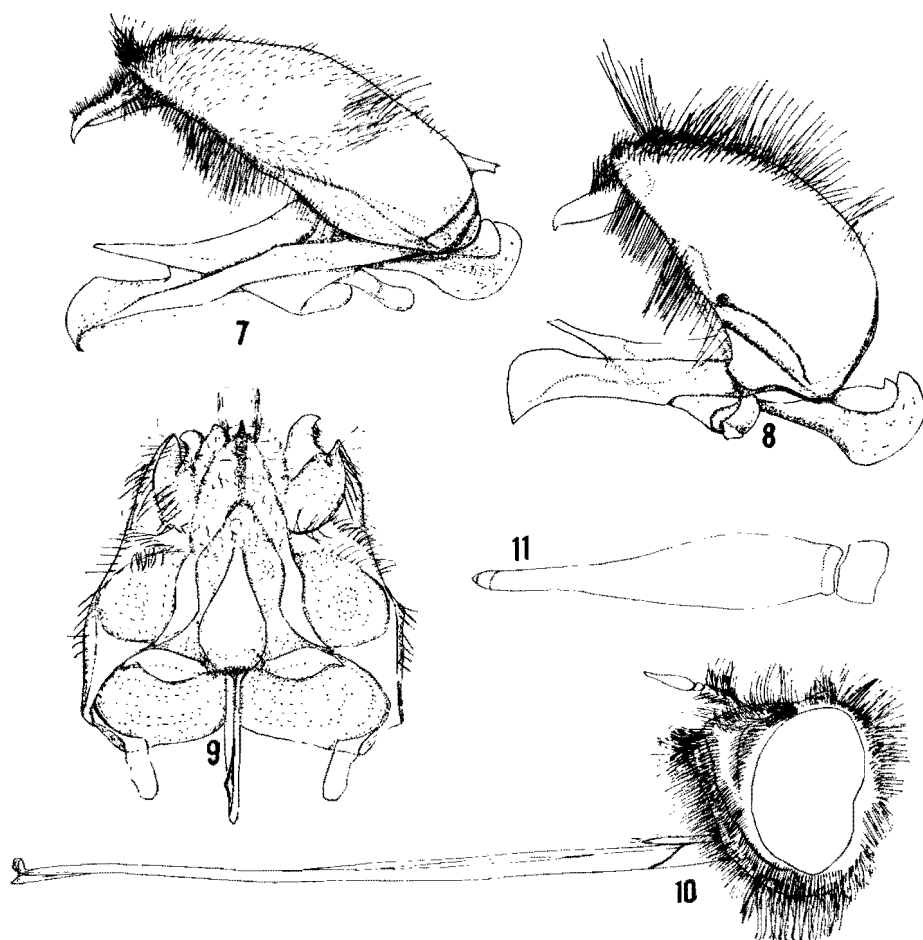
Bombylodes is a North African genus with a species in south and east Iran, namely, *asiaticus* (Becker) 1913, described as *Sparnopolius*. Further comment is made on the distribution of *Bombylodes* in the discussion following the next genus.

Genus *EFFLATOUNIA* Bezzi

Efflatounia Bezzi 1925: 170. Type species, *aegyptiaca* Bezzi, monotypic.

Karakumia Paramonov 1926: 77. Type species, *nigra* Paramonov, monotypic. **syn. nov.**

This genus has until now been considered to be an Egyptian endemic, a somewhat unlikely phenomenon. It can now be reported from Algeria and the synonymy of *Karakumia* extends the distribution east to Turkmenistan. After careful comparison



Figs 7-11. *Bombylodes* species. 7. *B. multisetosus* (Loew), male genitalia, side view. 8-11. *B. eximius* (Becker). 8-9. Male genitalia. 8. Side, and 9. ventral views. 10. Head, ♀, side view. 11. Third antennal segment.

of Paramonov's description of *Karakumia* with those of Bezzi (1925), Engel (1933) and Efflatoun (1945) of *Efflatounia*, I find no reason to keep them separate. Paramonov himself stressed the similarity of the two genera and the only differentiation is the presence of hairs at the apex of the third antennal segment of *Karakumia*, a character not of generic value.

The diagnosis of this genus is as follows: essentially as *Bombylodes*; bristly elements differentiated; eyes with a deep indentation in posterior margin, face more prominent; wing with alula reduced, linear, axillary lobe narrow throughout, first posterior cell open or closed at wing margin or short stalked; claws of male toothed; in

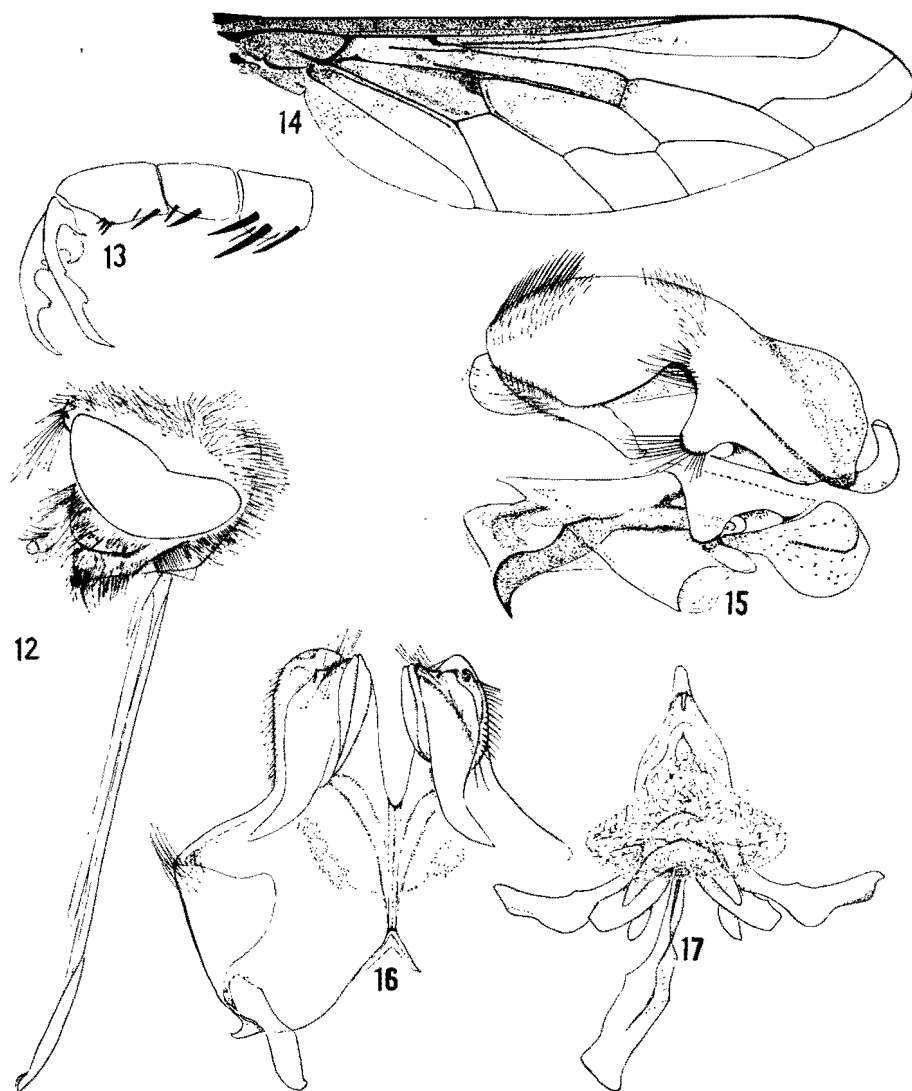
hypopygium basimeres strongly constricted medially, telomeres long but simple, aedeagus short, stout and with a large, partly membranous ventral accessory process.

***Eflatounia berbera* spec. nov., figs. 12–17**

MALE. *Body* black; occiput all grey dusted, frons obscurely brownish above antennae, dusted grey; parafacialia, face and genae light ferrugineous-red, face and upper facialia densely grey dusted; posterior pleural sutures ferrugineous-reddish, posterior lateral margins of first abdominal segment narrowly brownish. *Head* (fig. 12): occiput with short, stout white hair of somewhat beaded appearance on upper part, rather longer on lower head, beneath eyes with a distinct yellowish tinge, much longer along posterior buccal margin; ocellar tubercle with long, dark brownish hair; swollen frontal area, facialia, face and genae with rather sparse, long stiff brownish hair, more or less yellowish around buccal margin and across lower facialia; antennae (third segments missing) black, with short blackish hair; proboscis and palps black. *Thorax*: mesonotum with dense, very pale straw-yellowish pubescence with more bristly, brownish elements intermixed, a band from notopleura to post-alar calli more sericeous-white without intermixed dark elements; pleural pubescence mainly whitish, mesopleural tuft with some pale straw-yellowish hair and brownish bristles, hypopleural tufts yellowish basally, prosternal tuft white; scutellum with long, whitish hair, some long, blackish ones intermixed, marginal bristles long, fine, black; mesonotal bristles long and stout, pre-alars yellow, post-alars numerous, a major row of 8 very long and strong, mostly black but 2 yellow ones on each side, somewhat shorter and finer bristles anterior to main row, the posterior margins of post-alar calli with a dense fringe of long, stiff whitish hair, basally yellowish. *Abdomen* with long, rather shaggy pubescence but that on I short and dense, rather ochraceous discally beneath scutellum, the lateral tuft somewhat longer, whitish but basally yellowish; hairs otherwise whitish, sericeous gleaming at tips, light yellowish basally; bristles fine, black, concentrated in double or treble rows across hind margins of II to VIII with a rather broad median band of similar bristles from II to VII, sides with much denser black bristles; venter with sparser pubescence of white hair and inter-mixed black bristles, denser at apex. *Legs* (only right middle, right hind femur and left hind without last 3 tarsal segments, remaining): femora blackish-brown, tibiae and basitarsi yellowish, other tarsal segments darkening from yellowish-brown to black; claws (fig. 13) black; femora with whitish scales, mid femur without spines but long black, ventral hair, hind femora with 5–6 stout yellow spines on apical half interspersed with fine black hair of same length as spines; spicules of tibiae and basitarsi stout, yellow, those on rest of tarsus black, third segment of second tarsus with a ventral cluster of stout spicules (fig. 13). *Wing* (fig. 14) sub-hyaline with a brownish antero-basal infuscation as illustrated; basal comb virtually absent, axillary lobe narrow throughout and not much wider than anal cell, alula reduced to a linear lobe; squamae small, whitish with yellowish margin and long white fringe; haltere brownish, apex of knob light yellowish. *Hypopygium* (figs 15 to 17): basimeres reddish-ferrugineous around margins, medially black, last apparent sternite (tergite IX) reddish-ferrugineous around margin, the produced corners yellowish, otherwise black; basimeres with apical tuft of stout bristles, base of telomere with tuft of long, fine hairs; ventral aedeagal process large, with heavily sclerotised ventral hook.

Length of body 10,5 mm, of wing 11,0 mm, of proboscis 5,5 mm.

FEMALE. Unknown.



Figs 12–17. *Efflatounia berbera* spec. nov. 12. Head, ♂, side view. 13. Apical tarsal segments and claws, middle leg. 14. Wing. 15–17. Male genitalia. 15. Side view. 16. Basimeres and telomeres, ventral view. 17. Aedeagal complex, ventral view.

MATERIAL EXAMINED. ♂-Holotype: Algeria, El Kantara, 16.iv.1913 (P.A. Buxton). In British Museum (Natural History).

This species differs from *E. aegyptiaca* in the colour of the pubescence and legs and in having a definite wing infuscation. The generic diagnosis indicates the similarity of *Efflatounia* to *Bombylodes* and this extends to a very similar sexual dimorphism in pubescence in *E. aegyptiaca* and *B. multisetosus*. The male genitalia of *berbera* are very like those of *multisetosus* and *eximius*, the main difference being the greater development of the ventral aedeagal process in *berbera*. The similarities between the two genera, together with their almost coincident range, suggest that they should be merged into a single genus with two subgenera. However, *Efflatounia* is the older name, so that the generic name would be that of the apomorph subgenus. The emarginate eye, tendency to closure of the first posterior cell, the presence of toothed claws in the male and the enlarged aedeagal process are all apomorphic characters and it is thus preferable to accept *Bombylodes* and *Efflatounia* as separate but closely allied genera.

Bombylodes is continuously distributed from south-eastern Spain (the type locality of *multisetosus* is Cartagena) to southern Sinai, with a gap then to south-west Iran and Iranian Baluchistan, the localities of *asiaticus* [fig. 6; Abbassian-Lintzen (1966) records *multisetosus* in a pale form from NE of Ahwaz. This is almost certainly *asiaticus* which is pale, like *eximius*, the latter species having been considered merely a pale form of *multisetosus*]. *Efflatounia* occurs in Algeria and in eastern Egypt, including Sinai, suggesting that it too may have a continuous North African distribution, and it also has a widely disjunct locality, in Turkmenistan. These isolated eastern localities may indicate a disruption by the Middle East deserts of a previously continuous distribution, but it is likely that both genera will still be found at suitable localities in the gap. The distribution is essentially northern African and possibly of relatively recent origin. The Iranian localities bestride the Zagros fold in southern Iran, which presumably marks the join of the Iranian plate with Asia (Takin 1972). The origin of *B. asiaticus* and *E. nigra* is assumed to be subsequent to the closing of Iran and Asia and is thus probably post-Miocene. Whether this date is appropriate to generic origins is less clear. Neither genus has any direct counterpart in the rest of Africa so that both seem to be of northern origin at some time subsequent to the period in which *Dischistus* split i.e. they are younger than *Dischistus*.

The relationships of *Bombylodes* and *Efflatounia* with some other genera are of interest. The male genitalia are remarkably like those of the South African *Adelidea* Macquart and *Sosiomyia* Bezzi. Both southern genera belong to the *Dischistus* series, having broad head and female frons, inflated face, bare metapleura but well developed hypopleural tufts, wing with an obtuse discal cell and r-m a long way down this cell. They thus represent a South African development parallel to *Bombylodes* and *Efflatounia*, though the southern genera have developed three submarginal cells in the wing. This development has an interesting South American parallel.

It is natural to compare *Efflatounia* with the other bombyliine genera possessing emarginate eyes. It is at once distinct from the African *Eurycarenum* Loew by the absence of a metapleural tuft and the position of r-m. *Eurycarenum* has a dense metapleural tuft and r-m well in the basal half of the discal cell and is a genus of the *Bombylius* series. This leaves for consideration the American genera *Heterostylum* Macquart and *Triploechus* Edwards. The male genitalia of *Heterostylum ferrugineum* Macquart and *Triploechus heteroneurus* Edwards (the type species) are shown in figs 18 and 19. It is clear that

those of *T. heteroneurus* differ in no significant feature from those of *Efflatounia* and *Bombylodes*, whereas there are substantial differences between these three and *Heterostylum*. *Triploecheus* is a South American genus of the *Dischistus* series, agreeing in all essentials such as, inflated face, prominent genae and genal sulcus, broad, depressed female frons, bare metapleura but well developed hypopleural tufts, obtuse discal cell with r-m far down this cell; but *Triploecheus* has three sub-marginal cells. It is the southern Neotropical counterpart of *Adelidea* and its distribution is shown in fig. 6. The small area shown in California, New Mexico and Arizona depends on the validity of the allocation of the Nearctic species *novum* Williston and *vierecki* Painter to *Triploecheus*. The Nearctic area is widely disjunct and, if the generic allocations are correct, represents a Caenozoic extension of the genus into North America. While the generic status of the two North American species may be a matter for further investigation, *Triploecheus* cannot remain as a subgenus *Heterostylum*, as it is treated by Painter (1930) and Painter & Painter (1965). Apart from the male genitalia there are significant differences in head structure, type and distribution of pubescence as well as wing venation, all of which differentiate *Triploecheus* and *Heterostylum*. The latter genus belongs to the *Dischistus* series and is widely distributed in South America and in south-western North America (except *robustum* O.S., which has a more extensive though still southern distribution in North America), indicating that in North America *Heterostylum* is also a recent invader from the Neotropical Region. The wide distribution of the *Dischistus* series genera in the Americas seems to contrast with the apparent absence of comparable genera from most of Africa. In fact, *Gonarthus* Bezzi and *Sisyrophanus* Karsch belong to the group and, between them, occupy most of Africa south of the Sahara. *Sisyrophanus* has been considered a somewhat isolated genus but, because of its wing venation, of the *Bombylius* series. It is part of the *Dischistus* series, immediately distinguished by the bare, shining, prominent face, a character also found in the related Nearctic-Neotropical *Sparnopolius* Loew.

It is thus possible to define a group of allied genera common to Africa and America and forming an obvious Gondwanan unit. Genera belonging to the group occur in Australia, for instance *Eusurbus* Roberts, which provides a firm anchorage in Gondwana and suggest an early Mesozoic, possibly Triassic, origin. An ancestral form would have had at least the following characters: head broad, as broad or broader than thorax, male dichoptic, female with very broad, furrowed frons and probably sunken vertex, face prominent, bare, antennae elongate, first segment not inflated, third carrying a well developed terminal style of at least three distinct segments; body densely pilose, bristles strong, ptero- and metapleura bare but hypopleural area with at least one (probably katapimeral) tuft; wing with basal expansion of costa (basal comb) small or absent, two submarginal cells, r-m far down discal cell, the latter with inter-radial ml-m2 long, first posterior cell wide open.

So far as I am aware, there has been no previous attempt to construct a comparable set of relationships, distributions and possible origins for other genera of Bombyliidae. In the context of the introductory comments of this paper, what are generally accepted as southern Palaearctic distributions, distinct from the Ethiopian Region, are shown not to be so. They are distributions of African genera of an old Gondwanan stock which have only recently invaded southern Europe and Asia, and the Mediterranean coast of Africa is still, with these genera, part of the African Region.

The genus *Sparnopolius* has been mentioned. It must be referred to again in connection with a species described from Africa whose status has been in doubt. Bezzi (1924:90) described *Dischistus aurifluus* from "the Cape of Good Hope, without more

precise locality"—or any other data. The species is peculiar in the African fauna in possessing a bare, shining face, a character not known among related African genera, except for *Sisyrophanus*, to which *aurifluus* definitely does not belong. Hesse (1938) could not place the species, but with considerable prescience suggested that it might not be African. The type, a female, is in the British Museum (Natural History), is in good condition and is a wrongly located specimen of *Sparnopolius lherminierii* (Macquart) (*fulvus* Wiedemann), the Nearctic type species of *Sparnopolius*. Thus *Dischistus aurifluus* Bezzi = *Sparnopolius lherminierii* (Macquart), **syn. nov.** and must be deleted from the African list.

Genus *BOMBYLISOMA* Rondani

Bombylisoma Rondani 1856: 164. Type species, *Bombylius sulphureus* Fabricius = *Bombylius minimus* Schrank, by original designation.

Chasmoneura Hesse 1938: 586. Type species, *Bombylius argyropygus* Wiedemann, by original designation. **syn. nov.**

Dischistus of numerous authors, *not* Loew.

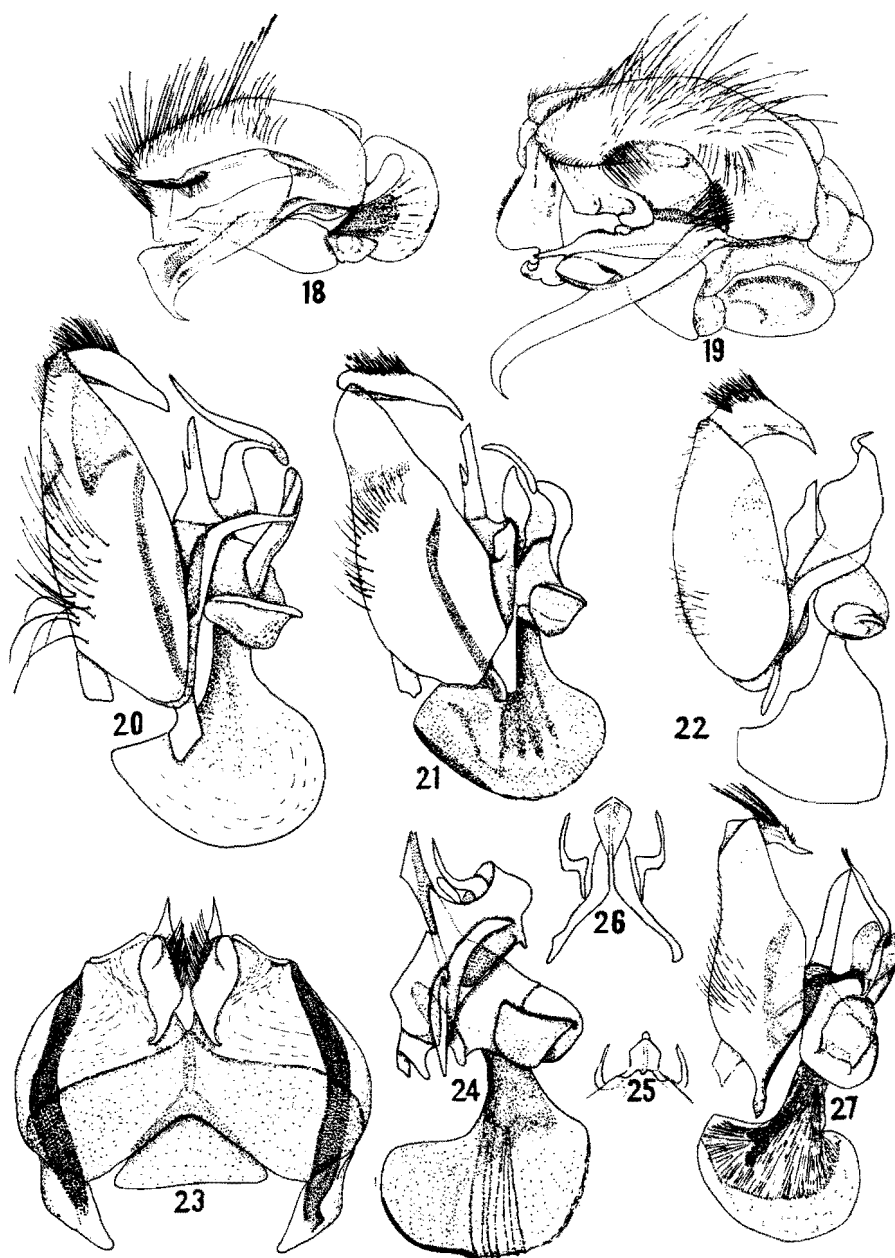
A consequence of the erroneous citation of *B. minimus* as type species of *Dischistus* has been the relegation of Rondani's genus to the synonymy of *Dischistus*. Hesse (1938) commented that, not knowing the European "*Dischistus*" *minimus*, he was unable to say whether it conformed to his genus *Chasmoneura*. A detailed comparison of specimens of *minimus* from different localities in Europe and Asia Minor with several African species of *Chasmoneura*, including *argyropygus*, leaves no doubt that all belong to the same genus. The more important references to *Dischistus* and *Chasmoneura*, starting from Brunetti, are:

Dischistus auctt. *nec* Loew: Brunetti 1920: 273; Paramonov 1926b: 155, in part; 1940: 69, 340; Séguy 1926: 238; Engel 1933: 181, in part; Efflatoun 1945: 240, in part; François 1962: 2; 1966: 158; 1969: 134; Zaitsev 1966: 106; 1969: 557; Abbassian-Lintzen 1966: 326, in part; Trojan 1967: 32.

Chasmoneura Hesse: Bowden 1964: 42; Greathead 1967: 223; 1970: 99.

Bombylisoma is neuter in gender and all the African species of *Chasmoneura* listed by Hesse (1938—except *aurifluus* Bezzi) should be transferred as new combinations, as well as *argentatum* Greathead 1967, **comb. nov.**, from Eritrea, and *nigellum* Greathead 1970, **comb. nov.**, from Mali, Mauretania and, a new record, the far north of Nigeria. The redesignation of the North African and Palaearctic species is less straightforward. These northern species are badly in need of revision as there is a good deal of intraspecific variability, similar to that of some of the southern species, which has resulted in colour forms being named as species. For the present, all that can be done is to consider the species listed as *Dischistus* by Paramonov (1940) as *Bombylisoma*, except as noted below, accepting Efflatoun's (1945) correct synonymy of *pulchellum* Austen with *trigonum* Bezzi and adding *mofidii* Abbassian-Lintzen 1966, **comb. nov.**, from Iran.

The taxonomy of the Bombyliidae is still too primitive to establish categories between the genus and the subfamily. Even at subfamily level the limits are by no means clear and among genera there is much confusion, hence the use of the term "*Dischistus* series" rather than a more definitive usage. *Bombylisoma* belongs to the *Bombylius* series, which is most simply defined as possessing a well developed metapleural tuft and with r-m being not more than half way along the discal cell, usually much nearer the base. From the other genera of the *Bombylius* series, at any rate in the African, Palaearctic and Oriental Regions, *Bombylisoma* is readily separated by the consistently wide open first posterior cell and the reduced or absent basal comb of the wing. The male genitalia



Figs 18–27. *Triploechnus*, *Heterostylum* and *Bombylisoma* species, male genitalia. 18. *T. heteroneurus* Edwards, side view. 19. *H. ferrugineum* (Macquart), side view. 20. *B. minimum* (Schrank), side view. 21. *B. melanocephalum* (Fabricius), side view. 22. *B. senegalense* (Macquart), side view. 23–26. *B. nucule* (Bezzi). 23. Basimeres and telomeres, ventral view. 24. Aedeagal complex, side view. 25–26. Aedeagal process. 25. Ventral, and 26. Dorsal views. 27. *B. microlepidum* spec. nov., male genitalia, side view.

have simple basimeres and telomeres and the aedeagal sheath is produced apically into paired ventral appendages. Many species have extensive silvery or metallic scales, silvery scaling being a sexually dimorphic character confined to males. The presence of metallic, green-blue reflecting scales is not a sexual character and is distributed among species found in continental Africa, Madagascar and India.

The genus is an African taxon which has spread northwards as far as central Europe (*minimum*) and also occurs at the south-eastern limits of the Palaearctic Region in Transcaucasia. There is an interesting division into species with male genitalia similar to those of *minimum*, with long, curved ventral processes (fig. 20) and those with much shorter, stouter processes like *senegalense* (Macquart) (fig. 22). The North African and Palearctic species, so far as they are known, have male genitalia similar to *minimum*, as do the South African *argyropygum* and a species from Madagascar. I have not seen a male of the Indian species *resplendens* (Brunetti) but females show features very similar to the Madagascar species and to the Central and East African *gemmeum* (Bezzi). The continent from the southern edge of the Sahara to Eritrea to the Cape is dominated by the *senegalense-pectoralis* (Loew) species pair; the former is one of the commonest of all Diptera in the open woodlands of central, east and west Africa and seems to be actively evolving local races and invading new habitats in forest areas (Bowden 1964).

These facts point to the African origin of *Bombylisoma* and, since there are species with very similar characteristics in North Africa, all the way down the east side of the continent to South Africa, in Madagascar and in India it is also a Gondwanan taxon. The similarity of the species in Central and East Africa, Madagascar and India supports a pre-drift arrangement of the continents similar to that proposed by Smith & Hallam (1970), in which Madagascar is interposed between East Africa and India, rather than that of Dietz & Holden (1970), who propose a separation of India plus Madagascar which is geographically inappropriate in relation to the distribution of *Bombylisoma*. If the arrangement of Smith & Hallam (1970) is accepted as appropriate, a pre-Upper Cretaceous origin can be postulated.

It was shown that *Dischistus* has a widely disjunct distribution, most of Africa being occupied by different, though related, genera, suggesting that some calamity had split the genus into relict species groups. There is an interesting parallel in *Bombylisoma*. Species similar to *minimum* are found at the continental extremities, with most of the continent dominated by the *senegalense* complex. A small group of species, *nucale* Bezzi and its allies, which are found, especially in East Africa, in company with *senegalense*, present a special problem which is discussed later. In some large areas, e.g. much of West Africa, *senegalense* is the only species of the genus found. It is abundant in savanna woodlands of the *Isoberlinia* and *Brachystegia-Julbernardia* types, extends into the drier *Acacia* savannas, into forest-savanna mosaics and also into localities suffering degradation within the moist lowland forest areas. The complex is successful, highly adaptable, expanding and evolving and it is difficult to avoid the conclusion that, even if not of recent evolutionary origin, its present distribution is recent post-Pluvial. In *Bombylisoma* a highly plastic complex, not separable at generic level, occupies most of Africa where *Dischistus* is replaced by clearly defined genera. Thus the conditions which split *Dischistus* occurred much earlier than those which divided *Bombylisoma*, speculatively in an early Tertiary pluvial epoch, pluvial since *Dischistus* is a genus of arid and semi-arid areas and has been replaced by e.g. *Gonarthus* in the vegetation types occupied by *B. senegalense*, and a relatively distant epoch because of the time required to evolve distinct genera.

The *minimum* group seems to have radiated as explosively as the *senegalense* complex. The Palaearctic species are derived from African stock, as there is no doubt that *Bombylisoma* is an Afro-Gondwanan genus, and its penetration of Europe and Asia to the approximate limits shown in fig. 6 is post-Glacial. A more precise location of the routes and origins of this penetration, other than that North Africa is involved, must await study of the whole Northern fauna. Two northern species are briefly discussed and their genitalia illustrated. These two species represent the two groups into which the northern fauna can be divided.

Bombylisoma minimum Schrank fig. 20

This species is superficially extremely like *senegalense* or *pectorale* and, presumably as a result of its rapid colonisation of Europe and Asia, seems to vary in much the same way as does *senegalense* (for a discussion of this species, see Bowden 1964, Greathead 1967) although, as far as can be judged from the more limited material than that seen of *senegalense*, the morphometrics are more uniform in *minimum*.

The accepted interpretation of *minimum* is that of the form with dark pleura and venter, a form with pale pleura and venter having been named as *imitator* Loew and accepted by Engel (1933) as a good species. Some males from Turkey, agreeing exactly with the description of *imitator*, are not different in their genitalia from *minimum*, so that *imitator* is merely a colour variety of *minimum* (syn. nov.) and I suspect that *simulator* Loew is another form of *minimum*. Paramonov (1926a) tentatively suggested these synonymies and also thought that *nigriceps* Loew and *barbulum* Loew might be varieties of *minimum*. The second of these species is unknown to me but *nigriceps* is a valid species and the male genitalia of *barbulum* are illustrated by Zaitsev (1966) and show that it is also distinct from *minimum*.

The male genitalia of *minimum* are illustrated in fig. 20; basimeres comparatively elongate, internally with a narrow, heavily sclerotised band, with an anterior, fairly sparse tuft of long, dark hairs; telomeres elongate beak-shaped, with a dense basal tuft of short, stiff hair; aedeagus short and stout, ventral processes elongate, gently curved, apodeme simple, somewhat sclerotised basally; tergite IX (last apparent sternite) simple, more or less quadrate in side view, a row of long, stout bristles along the posterior margin covered by finer bristles.

The genitalia of *minimum* differ from those of *argyropygum* principally in the size and shape of the ventral processes. The two species are abundantly distinct though clearly belonging to the same genus.

Bombylisoma melanocephalum (Fabricius)

Very similar to *argyropygum*, of which it may be considered the North African vicariant. The two species agree in the very short, stout proboscis, generally tawny vestiture, elongate wings and, in the male, the silvery scaled abdomen, but are readily distinguished in both sexes by a different wing infuscation and in the males by a different extent of silvery scaling. The male genitalia of *melanocephalum* (fig. 21) closely resemble those of *argyropygum* but the aedeagus is shorter, the ventral process smaller and the curved processes distinctly less curved.

The *melanocephalum*-*argyropygum* group is widespread and occurs in the southern Soviet Republics and in Iran, where *melanocephalum* is reported to occur (Abbassian-Lintzen 1966) with the very similar *transcaspicum* Paramonov and *mofidii* Abbassian-Lintzen.

Bombylisoma nucale* (Bezzi), comb. nov., figs. 25–26**Dischistus nucalis* Bezzi 1924: 96, 71.**

This species was described from Angola (types), Malawi and Kenya. Bezzi placed it in his "lepidus section" while Hesse (1938) compared it with *argyropygum*. It is actually closely allied to *cinereitinctum* (Hesse), **comb. nov.**, and *rhodesiense* (Hesse), **comb. nov.**, so closely that *cinereitinctum* and *rhodesiense* could be considered as southern subspecies of *nucale*. The males are comparatively easily separated, *nucale* being distinguished by the bright fulvous or reddish to reddish-yellow occipital hair, but the females are very similar, *nucale* differing from the other two mainly in not having a bluish or greenish tinge to the pale body scales. The male genitalia of *nucale* (figs 23–26) are very similar to those of *cinereitinctum*, the basimeres even shorter and more prominently shouldered, telomeres broader and carried completely reflexed beneath the produced apices of the basimeres, aedeagus shorter, the ventral processes somewhat shorter, not or only slightly extending beyond the apex of aedeagus, apodeme rounder in profile with rather prominent darker lines ending in small marginal processes.

The females are rather variable in the colour of the pubescence, some having deep yellow to golden scales and hairs on the thorax and abdomen, others varying through paler shades of yellow to almost white. Also, the wings vary in the depth of colour, from uniformly and lightly suffused cinereous to somewhat darker basally to a distinct cinereous-yellow tinge throughout. This variation is important in relation to a female taken by myself in Western Nigeria, University of Ibadan Botanic Gardens, 22.xi.1966. In this female the pubescence is shining white on pleura and pale yellowish to white on the abdomen, very similar to females from Sebei, Uganda. The wings of the Ibadan female are decidedly cinereous, similar to a female from Makindu, Kenya. The antennal proportions, width of ocellar tubercle and of the frons of the Nigerian female are all within the limits of East African material and there are no discernible differences in the external genitalia, so that a significant extension of the range of *nucale* seems to be established.

B. nucale is common and widespread in the moist savanna woodlands of N.E. Uganda and in the drier woodlands of Uganda and Kenya, occurring in some localities with *senegalense*. In my experience, the species is invariably associated in East Africa with the blue flowered *Pentania ouranogyne* Sp. Moore (Rubiaceae), a common herb of East African savanna woodlands, including *Acacia-Commiphora* country. *B. nucale* has a long to very long proboscis; in dried specimens it is usually in a deep curve and up to 7 or 8 mm long but when relaxed or macerated it can be extended to 12 or 15 mm. The corolla tube of *P. ouranogyne* varies from 10 to 18 mm in one form of flower and from 8 to 23 mm in another form (Verdcourt 1952), which suggests that *nucale* is eutropic-oligotropic and in localities where *ouranogyne* is the only species of *Pentania* is presumably monotropic. Since the longer flowers of one of the forms of *P. ouranogyne* are deeper than the longest proboscis of *nucale* there is, presumably, an insect with a much longer proboscis associated with these long flowers and it is of interest to note that *Pentania* spp. have been recorded as food plants of the sphingid *Basiotbia medea* (Felder) in East Africa.

The distribution of the *nucale* group is shown in fig. 6 in relation to the distribution of *Pentania* [the continuity of the distribution of *Pentania* between Nigeria and South Sudan is an extrapolation from Verdcourt (1952), who suggests that *P. schweinfurthii* should occur all across equatorial Africa]. The concordance of the two distributions is remarkable and strongly suggests that the *nucale* group has evolved

in oligotropic relation with *Pentanisia*. Verdcourt infers that at least certain sections of *Pentanisia* are of recent origin and the habitat and distribution of the genus certainly support this premise. If *Pentanisia*, or species such as *ouranogyne* and *schweinfurthii* are recent, then the *nuale* group is also of recent origin, a conclusion consistent with the very close similarity of the species. However, the Nigerian specimen was taken in a locality from which *Pentanisia* is unknown and was captured hovering in a patch of sunlight about 3 m above ground beneath a tree in tall, old secondary forest, a habit and habitat quite unlike those of East African *nuale*. There may be a Nigerian race with a different ecology, including a different, though probably rubiaceous, flower association.

***Bombylisoma simba* spec. nov.**

MALE. *Body* black; buccal rim and buccal cavity parchment-grey; dense greyish, greyish-yellow or silvery dusting on occiput, frons, face, genae and lower head, pleura, sides of mesonotum, sides of first abdominal segment and entire venter, with narrow, paired admedian dusted stripes on mesonotum, ill defined but extending to about level of wing bases. *Head*: occiput white haired, somewhat stouter and tinged yellowish in an irregular band below ocellar tubercle, latter with long, black hair contrasting with occipital hair; eyes contiguous for a length about equal to length of tubercle, frontal hair tufts shining white, the tips suffused yellowish; hair on face and genae white with sericeous-yellow tinge; antennae black, first two segments with long, black hair, third of comparatively uniform width, style prominent; proboscis black, shining, palps blackish, pale haired. *Thorax*: mesonotal hair long, fine, predominantly pale sericeous-yellowish-white, some black ones medially, and with sparse, fine, adpressed pale brassy scales; pleura with long, shining white hair, tinged yellowish in upper mesopleural tuft and metapleural tuft; bristly elements of posterior mesopleuron distinctly more yellowish; scutellum with very long, pale yellowish hair and fine scales similar to those on mesonotum; 2-3 very strong pre-alar bristles, post-alar bristles long, yellow, scutellars fine, long, yellowish. *Abdomen*: first segment with erect, pale yellowish pubescence and a fringe of fine, pale brassy scales across posterior margin; II bicoloured, anterior half with deep black scales, posterior half with yellowish scales encroaching onto black half in middle, laterally attenuated and not reaching sides which are clothed by a conspicuous tuft of deep black hairs, the black half with black hairs, the yellow part with fine, pale yellowish hairs and a fringe of very long, fine, pale yellowish hairs across posterior margin; III to VII densely clothed with silvery scales, III with a small, median, black-and-yellow scaled spot on anterior margin, hairs on III to VII long, sparse, white; venter with long, pale yellowish white hair and shining white scales. *Legs* black with paler tibiae shading from dark mahogany of first pair to light brown of third pair; scales, and long fine hair beneath femora, white, spines and spicules black, first four femora without spines; claws brown with black tips, pulvilli pale brownish. *Wing* with strong antero-basal infuscation, the colour fading from base to a line approximately from apex of anal cell to end of R₁, the cell centres clearer except for second basal cell which is infuscate throughout, the base, costal cell and antero-basal part of first basal cell yellow, the other infuscation brownish, remainder of wing cinereous; veins brown, r-m about half way along discal cell which is blunt apically; basal comb with yellowish scales; squamae blackish, the thoracic darkest, with yellowish fringes; haltere yellow, base of knob darkened.

Length of body 6,25 mm, of wing 8,5 mm, of proboscis 5 mm in deep curve, 7-8 mm if straight.

FEMALE. Unknown.

MATERIAL EXAMINED. ♂ Holotype, Kenya, Simba, iv.1966 (R. H. Carcasson). In my collection.

This beautiful species seems to belong to the *argyropygum* group, having yellowish pubescence, yellowish-infusate wings, dusted and non-prominent face and, in the male, silvery abdomen. It differs from both *argyropygum* and *melanocephalum* not only in wing and abdominal patterns but also in the long, curved proboscis compared with the short, straight proboscis of the other two species. In its proboscis *simba* much resembles *nuale* which suggests that it, too, has developed a degree of flower specificity. The locality is in fact well within the range of *Petania ouranogyne*.

The name of the locality, Simba, also means "lion" in Swahili, and its use as a trivial name alludes to the light tawny general appearance of the species.

***Bombylisoma microlepidum* spec. nov., fig. 27**

♂ ♀. *Body* black. *Head*: occiput with dense, sericeous-white hair; eyes of male in contact for a distance equal to about twice length of ocellar tubercle, interocular space of female about twice width of tubercle; frons of male with greyish-white pollen and dense tufts of shining white, flattened elongate scales, frons of female shining jet-black with greyish pollen immediately above antennae and with lateral white scale tufts less shining and shorter than in male; face slightly projecting, broad, with a transverse line of white hair either side, centre of face and genae bare; antennae black, first 2 segments with short, black hairs, third with very short pubescence (visible $\times 35$), flattened and slightly wider medially with a small, offset apical style; proboscis black, finely spiculate below, palps black. *Thorax* with greenish bloom along anterior margin of mesonotum extending as paired admedian bands to hind margin; fine hairs on notum longer and white in male, shorter and black in female, those along notopleura dense, shining white, those on humeri white, those on pleura white in male, somewhat yellowish in female; scales dense, small, shining iridescent greenish-black, those on notum denser in female, a small tuft of narrow adpressed white scales on sternopleuron; scutellum with vestiture similar to mesonotum; bristles at base of wing yellowish or white, those on post-alar calli black, scutellar bristles white in male, black in female. *Abdomen* with hairs and bristles long and fine, almost entirely white including a dense lateral tuft on I; some shorter, stiffer bristly black hairs across hind margin of VII and on male genitalia; scales predominantly shining or iridescent greenish-black, with lateral white scale patches on IV and V and a more or less continuous white stripe on extreme reflexed edges of II to V, not visible from above; venter with white hair and scattered blackish scales which are white-reflecting at certain angles. *Legs* with coxae black, white haired, femora black with dull black scales which are denser on hind pair, fore and mid femora with some pale hairs below, hind pair with 3-4 antero-ventral spines, tibiae and tarsi yellowish to brownish-yellow, apical segments of tarsi and hind tibiae somewhat darker. Spicules all black; claws black, pulvilli whitish, barely half length of claws. *Wing* relatively very long, with a dimorphic antero-basal infuscation: in male base blackish, costal cell, basal half of first basal cell, most of second basal cell and bases of anal and axillary cells brownish, in females infuscation pale brown or

brownish-yellow confined to base, costal cell and anterior basal part of first basal cell; membrane otherwise hyaline; veins black to blackish-brown in male, brown to yellowish-brown in female; basal comb absent, axillary lobe narrow, about same width as anal cell; alula and squamae black in male, sub-hyaline in female, squamae white fringed; haltere black, somewhat paler at base of stem in female. *Hypopygium* (fig. 27) generally similar to that of *minimum*; basimeres elongate, hair tuft at base of telomere long and dense, aedeagus long and stout, ventral processes elongate, narrow. Length of body 3.6–4.0 mm, of wing 4.8–5.2 mm, of proboscis about 2 mm.

MATERIAL EXAMINED: ♂-Holotype, 1 ♂- and 3 ♀-paratypes. Madagascar, Tulear Province, Sakaraha, Lambomakondro, 550 m, 4–10. ii. 1957 (B. Stuckenberg); 2 ♀-paratypes, Madagascar, Sakaraha, 12.iii.1958 (F. Keiser). Holotype in the Natal Museum, Pietermaritzburg, paratypes in Natal Museum; Natural History Museum, Basle and in my collection.

This very interesting species differs from all the other species of the genus by the small scales and the bare, shining frons of the female. Other differences are the relatively longer eye contact in the male, the generally sparse hair (although e.g. *gemmeum* is similar in this respect), the reduced axillary lobe (*nucale* also has a narrow lobe) and the small pulvilli, but the male genitalia are so similar to those of *minimum* and *argyropygium* that the generic allocation is not in doubt.

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